



UNITED STATES OF AMERICA
FEDERAL COMMUNICATIONS COMMISSION
RADIO STATION AUTHORIZATION

Name: O3b Limited
Authorization Type: License
 Non Common Carrier

Call Sign: E130098
File Number: SES-LIC-20130528-00455
Grant date: 05/13/2014 **Expiration Date:** 05/13/2029

Nature of Service: Fixed Satellite Service
Nature of Service: Other
Class of Station: Other

A) Site Location(s)

#	Site ID	Address	Latitude	Longitude	Elevation (Meters)	Special Provisions NAD (Refer to Section H)
1)	Maritime Vessels	Coastal Reg. of the US: 7°-50° N.Lat.				NA

Licensee certifies antenna(s) comply with gain patterns specified in Section 25.209

Subject to the provisions of the Communications Act of 1934, The Communications Satellite Act of 1962, subsequent acts and treaties, and all present and future regulations made by this Commission, and further subject to the conditions and requirements set forth in this license, the grantee is authorized to construct, use and operate the radio facilities described below for radio communications for the term beginning May 13, 2014 (3 AM Eastern Standard Time) and ending May 13, 2029 (3 AM Eastern Standard Time) . The required date of completion of construction and commencement of operation is May 13, 2015 (3 AM Eastern Standard Time) . Grantee must file with the Commission a certification upon completion of construction and commencement of operation.

B) Particulars of Operations

The General Provision 1010 applies to all receiving frequency bands.
 The General Provision 1900 applies to all transmitting frequency bands.
 For the text of these provisions, refer to Section H.

#	Frequency (MHz)	Polarization Code	Emission	Tx/Rx Mode	Max EIRP /Carrier (dBW)	Max EIRP Density /Carrier (dBW/4kHz)	Associated Antenna	Special Provisions (Refer to Section H)	Modulation/ Services
1)	28600.0000-29100.0000	L,R	216MG7D	Tx	64.52	17.20	Orb1.2		Various Modulations up to 32APSK; Digital Data Link
2)	28600.0000-29100.0000	L,R	5M12G7D	Tx	57.53	26.46	Orb1.2		Various Modulations up to 32APSK; Digital Data Link
3)	18800.0000-19300.0000	L,R	216MG7D	Rx			Orb1.2		Various Modulations up to 32APSK; Digital Data Link
4)	18800.0000-19300.0000	L,R	5M12G7D	Rx			Orb1.2		Various Modulations up to 32APSK; Digital Data Link
5)	28600.0000-29100.0000	L,R	216MG7D	Tx	70.52	23.20	Orb2.2		Various Modulations up to 32APSK; Digital Data Link
6)	28600.0000-29100.0000	L,R	5M12G7D	Tx	61.49	30.42	Orb2.2		Various Modulations up to 32APSK; Digital Data Link
7)	18800.0000-19300.0000	L,R	216MG7D	Rx			Orb2.2		Various Modulations up to 32APSK; Digital Data Link



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8)	18800.0000-19300.0000	L,R	5M12G7D	Rx			Orb2.2		Various Modulations up to 32APSK; Digital Data Link

C) Frequency Coordination Limits

#	Frequency Limits (MHz)	Satellite Arc (Deg. Long.)		Elevation (Degrees)		Azimuth (Degrees)		Max EIRP Density toward Horizon (dBW/4kHz)	Associated Antenna(s)
		East Limit	West Limit	East Limit	West Limit	East Limit	West Limit		
1)	18800.0000-19300.0000			NGSO	10.0-10.0	000.0-000.0			Orb1.2
2)	28600.0000-29100.0000			NGSO	10.0-10.0	000.0-000.0	-11.05		Orb1.2
3)	18800.0000-19300.0000			NGSO	10.0-10.0	000.0-000.0			Orb2.2
4)	28600.0000-29100.0000			NGSO	10.0-10.0	000.0-000.0	-11.05		Orb2.2

D) Points of Communications

The following stations located in the Satellite orbits consistent with Sections B and C of this Entry:

- 1) Maritime Vessels to O3b Limited NGSO satellite system (UK-licensed)

E) Antenna Facilities

Site ID	Antenna ID	Units	Diameter (meters)	Manufacturer	Model number	Site Elevation (Meters)	Max Antenna Height (Meters)	Special Provisions (Refer to Section H)
Maritime Vessels	Orb1.2	100	1.2	Orbit Communications	AL-7103-Ka		0 AGL	
Max Gains(s): 48.5 dBi @ 29.1000 GHz 42.9 dBi @ 17.8000 GHz								
Maximum total input power at antenna flange (Watts) =					40.00			
Maximum aggregate output EIRP for all carriers (dBW) =					64.52			



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Site ID	Antenna ID	Units	Diameter (meters)	Manufacturer	Model number	Site Elevation (Meters)	Max Antenna Height (Meters)	Special Provisions (Refer to Section H)
Maritime Vessels	Orb2.2	100	2.2	Orbit Communications	AL-7107-Ka		0 AGL	
Max Gains(s):		54.5 dBi @	29.1000 GHz	48.4 dBi @	19.2000 GHz			
Maximum total input power at antenna flange (Watts) =					40.00			
Maximum aggregate output EIRP for all carriers (dBW) =					70.52			

F) Remote Control Point:

Maritime Vessels	8000 Gainsford Court	Call Sign:
	Bristow, Prince William, VA 20136	
	202-421-7122	

G) Antenna Structure marking and lighting requirements:

None unless otherwise specified under Special and General Provisions

H) Special and General Provisions

- A) This RADIO STATION AUTHORIZATION is granted subject to the following special provisions and general conditions:
- 1010 --- Applicable to all receiving frequency bands. Emission designator indicates the maximum bandwidth of received signal at associated station(s). Maximum EIRP and maximum EIRP density are not applicable to receive operations.
 - 1900 --- Applicable to all transmitting frequency bands. Authority is granted to transmit any number of RF carriers with the specified parameters on any discrete frequencies within associated band in accordance with the other terms and conditions of this authorization, subject to any additional limitations that may be required to avoid unacceptable levels of inter-satellite interference.
 - 2010 --- This authorization is issued pursuant to the Commission's Second Report and Order adopted June 16, 1972 (35 FCC 2d 844) and Memorandum, Opinion and Order adopted December 21, 1972 (38 FCC 2d 665) in Docket No. 16495 and is subject to the policies adopted in that proceeding.
 - 2916 --- Transmitter(s) must be turned off during antenna maintenance to ensure compliance with the FCC-specified safety guidelines for human exposure to radiofrequency radiation in the region between the antenna feed and the reflector. Appropriate measures must also be taken to restrict access to other regions in which the earth station's power flux density levels exceed the specified guidelines.



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H) Special and General Provisions

A) This RADIO STATION AUTHORIZATION is granted subject to the following special provisions and general conditions:

- 2938 --- Upon completion of construction, each licensee must file with the Commission a certification including the following information: name of the licensee, file number of the application, call sign of the antenna, date of the license and certification that the facility as authorized has been completed, that each antenna facility has been tested and is within 2 dB of the pattern specified in Section 25.209 and that the station is operational including the date of commencement of service and will remain operational during the license period unless the license is submitted for cancellation.
- 3219 --- All existing transmitting facilities, operations and devices regulated by the Commission must be in compliance with the Commission's radiofrequency (RF) exposure guidelines, pursuant to Section 1.1307(b)(1) through (b)(3) of the Commission's rules, or if not in compliance, file an Environmental Assessment (EA) as specified in Section 1.1311. See 47 CFR § 1.1307 (b) (5).
- 5216 --- All operations shall be on a non-common carrier basis.
- 6597 --- O3b Limited is GRANTED a waiver of Section 25.145(c) of the Commission's rules, 47 C.F.R § 25.145(c), with respect to the geographic service coverage requirements for the O3b Limited NGSO satellite system. O3b Limited's provision of service for maritime vessels will be limited to maritime regions, the coastal regions of the U.S. from 7° N to 50° N latitude, which are less extensive than the geographic coverage areas required in Section 25.145(c) of the Commission's rules. Grant of this waiver is without prejudice to action on any waiver request filed in connection with an application to provide additional services to, from, or within the United States communicating with O3b Limited's NGSO system.
- 6598 --- This grant is based upon a finding that O3b Limited is and will be subject to direct and effective regulation by the United Kingdom concerning orbital debris mitigation. This grant will remain effective only to the extent that launch and space operations continue to be authorized by the United Kingdom Space Agency under the United Kingdom Outer Space Act.
- 6599 --- When the earth station network on maritime vessels is put into operation, the licensee must file with the Commission a certification including the following information: name of the licensee, file number of the application, call sign of the antennas, date of the license and certification that the network was put into operation and will remain operational during the license period unless the license is submitted for cancellation.



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A) This RADIO STATION AUTHORIZATION is granted subject to the following special provisions and general conditions:

- 6600 --- The licensee shall take all necessary measures to ensure that the earth stations on maritime vessels do not create potential exposure of humans to radiofrequency radiation in excess of the FCC exposure limits defined in 47 C.F.R §§ 1.1307(b) and 1.1310 wherever such exposures might occur. Measures must be taken to ensure compliance with limits for both occupational controlled exposure and for general population/uncontrolled exposure, as defined in these rule sections. Requirements for restrictions can be determined by predictions based on calculations, modeling or by field measurements. The FCC's OET Bulletin 65 (available on-line at www.fcc.gov/oet/rfsafety) provides information on predicting exposure levels and on methods for ensuring compliance, including the use of warning and alerting signs and protective equipment for workers. The licensee shall ensure installation of terminals on the maritime vessels by qualified installers who have an understanding of the antenna's radiation environment and the measures best suited to maximize protection of the general public and persons operating the maritime vessel and equipment. A terminal exhibiting radiation exposure levels exceeding 1.0 mW/cm² in accessible areas, such as at the exterior surface of the radome, shall have a label attached to the surface of the terminal warning about the radiation hazard and shall include thereon a diagram showing the regions around the terminal where the radiation levels could exceed 1.0 mW/cm². Transmitter(s) must be turned off during antenna maintenance to ensure compliance with FCC-specified safety guidelines for human exposure to radiofrequency radiation in the region between the antenna feed and the reflector.
- 6601 --- O3b Limited's earth stations on maritime vessels authorized herein must employ a tracking algorithm that is resistant to capturing and tracking adjacent satellite signals, and each station must be capable of inhibiting its own transmission in the event it detects unintended satellite tracking.
- 6602 --- O3b Limited's earth stations on maritime vessels authorized herein must be monitored and controlled by a ground-based network control and monitoring center. Such stations must be able to receive "enable transmission" and "disable transmission" commands from the network control center and must cease transmission immediately after receiving a "parameter change" command until receiving an "enable transmission" command from the network control center. The network control center must monitor operation of each earth station to determine if it is malfunctioning, and each earth station on maritime vessels must self-monitor and automatically cease transmission within 100 milliseconds on detecting an operational fault that could cause harmful interference.
- 6603 --- Operation in the territorial waters of any country other than the United States must be in compliance with the applicable laws, regulations, and licensing procedures of that country, as well as with the conditions of this authorization.
- 6604 --- Antenna elevation for all operations must be at least 5 degrees above the geographic horizon.
- 6605 --- Transmissions between the earth stations under call sign E130098 and O3b Limited's NGSO space stations must comply with existing and future coordination agreements reached between the United Kingdom and other Administrations, including the United Kingdom and the United States (see e.g., UK telefax SSU 2000 dated 29 May 2009).
- 6606 --- Transmissions from O3b Limited's NGSO space stations to earth stations under call sign E130098 in the 18.8-19.3 GHz frequency band (space-to-Earth) must comply with the power flux-density requirements of 47 C.F.R § 25.208(e) and Article 21 of the International Telecommunication Union Radio Regulations.



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- 6607 --- Earth stations under call sign E130098 may not receive transmissions from O3b Limited's NGSO space stations in the 18.8-19.3 GHz frequency band (space-to-Earth) until O3b Limited has completed coordination of its NGSO system with all Federal FSS systems in the 18.8-19.3 GHz frequency band under 47 C.F.R. § 2.106, Footnote US334.
- 6608 --- The Satellite Division has previously determined that O3b Limited has met the first four milestones for an NGSO satellite system (execute a non-contingent contract for construction, complete critical design review of the satellite system, commence construction of the first satellite in the system, and launch the first space station), and O3b has timely filed a bond with the Commission, pursuant to the procedures set forth in 47 C.F.R. § 25.165. Accordingly, authority for the earth stations under call sign E130098 to transmit to and receive transmissions from the O3b Limited NGSO space stations will be null and void, with no further action on the Commission's part, if O3b Limited does not meet the following condition: Bring all eight satellites into operation by March 25, 2016.
- 6609 --- The licensee must comply with any pertinent limits and provisions established by the International Telecommunication Union to protect other services allocated internationally.
- 6610 --- O3b Limited is granted a waiver of the Table of Frequency Allocations, Section 2.106 of the Commission's rules, and a waiver of the Ka-band Plan, see Rulemaking to Amend Parts 1, 2, 21, and 25 of the Commission's Rules to Redesignate the 27.5-29.5 GHz Frequency Band to Reallocate the 29.5-30.0 GHz Frequency Band, to Establish Rules and Policies for Local Multipoint Distribution Services and for Fixed Satellite Services, First Report and Order and Fourth Notice of Proposed Rulemaking, 11 FCC Rcd 19005 (1996). O3b Limited is authorized to operate in the 18.8-19.3 GHz and 28.6-29.1 GHz frequency bands for maritime use, on a non-harmful interference basis, that is, O3b Limited must not cause harmful interference to, and must not claim protection from interference caused to it by, any other lawfully operating station, and must cease transmission(s) immediately upon notice of such interference. O3b provided an analysis that it will not cause interference to any GSO satellite network operating in these bands and will accept interference from any terrestrial users. Based on the information on file with the Commission, the proposed operations do not pose a risk of interference to other users of the band.
- 6611 --- Operation of earth stations on maritime vessels authorized herein are subject to any requirements the Commission may adopt in any future proceeding concerning operations in the 18.8-19.3 GHz and 28.6-29.1 GHz frequency bands including, but not limited to, earth stations on maritime vessels communicating with geostationary and non-geostationary orbit space stations.
- 6612 --- O3b Limited's earth stations on maritime vessels authorized herein must be in compliance with the terms of coordination agreements with operators of non-geostationary orbit Fixed Satellite Service space stations operating in the 18.8-19.3 GHz and 28.6-29.1 GHz frequency band. In the event another NGSO system commences operations in the U.S. market in the 18.8-19.3 GHz and 28.6-29.1 GHz frequency bands, maritime earth stations operating pursuant to this authorization must cease operation unless and until such operation has been coordinated with the new NGSO system operator or O3b Limited demonstrates that such operation will not cause harmful interference to the new NGSO system.



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- 6613 --- The licensee must maintain the following records for each antenna on maritime vessels: a record of the ship location (i.e., latitude and longitude), transmit frequency, channel bandwidth and satellite used. These records shall be time annotated and maintained for a period of not less than 1 year. Records will be obtained at time intervals of no greater than every 20 minutes while the antenna is transmitting. The licensee will make this data available upon request to a coordinator, fixed system operator, fixed satellite system operator, or the Commission within 24 hours of the request.
- 6614 --- The grant of this application, as amended, and accompanying waivers, is without prejudice to any action on any pending or future applications or waiver requests filed to provide additional services to, from, or within the United States using O3b Limited's NGSO system. The authorization is limited to the earth station(s) and antenna(s) included in Section E above and to the particulars of operations/identified frequencies included in Section B above (and the licensee's application) and does not permit O3b's NGSO system to communicate with any other earth station(s) in the United States.
- 6615 --- O3b Limited is authorized to operate up to one-hundred 2.2 meter earth stations, and up to one-hundred 1.2 meter earth stations on maritime vessels to communicate with O3b Limited's NGSO system, licensed by the United Kingdom, using the 18.8-19.3 GHz (space-to-Earth) and 28.6-29.1 GHz (Earth-to-space) frequency bands. O3b Limited may operate up to three earth stations on each maritime vessel. The remote control point is a material term of the license and may not be changed without prior authorization under Section 25.117 of the Commission's rules. Public Notice "The International Bureau provides Guidance Concerning the Relocation of Earth Station Remote Control Points," DA 06-978 (rel. May 4, 2006).
- 6616 --- O3b Limited must submit to the Commission a yearly report indicating the number of earth stations actually brought into service under its blanket licensing authority. The annual report is due to the Commission no later than the first day of April of each year and shall indicate the deployment figures for the preceding calendar year. See 47 C.F.R. § 25.145(f)(1)(iv)(2).
- 90035 --- O3b Limited must maintain an electronic web site bulletin board listing the ephemeris data for each satellite in the O3b Limited NGSO constellation, using the North American Aerospace Defense Command (NORAD) two-line orbital element format. O3b Limited must update the orbital elements at least once every three days.
- 90041 --- O3b Limited IS GRANTED a waiver of Section 25.210(i)(1) of the Commission's rules, 47 C.F.R § 25.210(i)(1), with respect to the cross-polarization isolation requirements for the O3b Limited NGSO satellite system space station antennas.
- 90043 --- O3b Limited is GRANTED waivers of Sections 25.137(c) and 25.157 of the Commission's rules, 47 C.F.R §§ 25.137(c) and 25.157, regarding modified processing round and band segmentation procedures. O3b Limited will employ satellite diversity at low to medium latitudes, which will enable it to share spectrum with other NGSO FSS systems. At higher latitudes, O3b Limited will employ a band segmentation approach to accommodate other systems if interference occurs. Given the opportunities for additional entrants to operate in O3b Limited's requested frequency bands, we authorize this earth station to transmit to and receive transmissions from the O3b Limited NGSO space stations throughout the requested frequencies. See, e.g., Northrop Grumman Space & Missions Systems Corp., DA 09-428, Order and Authorization, 24 FCC Rcd 2330, 2342 31-33 (Int'l Bur. 2009); Digital Globe, Inc., DA 05-2640, Order and Authorization, 20 FCC Rcd 15696, 15698-99 6-8 (Int'l Bur. 2005); Space Imaging, LLC, IB Docket No. 02-34, Declaratory Order and Order and Authorization, 20 FCC Rcd 11964, 11968 10 (Int'l Bur. 2005).



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A) This RADIO STATION AUTHORIZATION is granted subject to the following special provisions and general conditions:

- 90075 --- Licensee is afforded 30 days from the date of release of this grant and authorization to decline this authorization as conditioned. Failure to respond within this period will constitute formal acceptance of the authorization as conditioned.
- 90094 --- The licensee must maintain a U.S. point of contact available 24 hours per day, seven days per week, with the authority and ability to terminate operations authorized herein.



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B) This RADIO STATION AUTHORIZATION is granted subject to the additional conditions specified below:

This authorization is issued on the grantee's representation that the statements contained in the application are true and that the undertakings described will be carried out in good faith.

This authorization shall not be construed in any manner as a finding by the Commission on the question of marking or lighting of the antenna system should future conditions require. The grantee expressly agrees to install such marking or lighting as the Commission may require under the provisions of Section 303(q) of the Communications Act. 47 U.S.C. § 303(q).

Neither this authorization nor the right granted by this authorization shall be assigned or otherwise transferred to any person, firm, company or corporation without the written consent of the Commission. This authorization is subject to the right of use or control by the government of the United States conferred by Section 706 of the Communications Act. 47 U.S.C. § 706. Operation of this station is governed by Part 25 of the Commission's Rules. 47 C.F.R. Part 25.

This authorization shall not vest in the licensee any right to operate this station nor any right in the use of the designated frequencies beyond the term of this license, nor in any other manner than authorized herein.

This authorization is issued on the grantee's representation that the station is in compliance with environmental requirements set forth in Section 1.1307 of the Commission's Rules. 47 C.F.R. § 1.1307.

This authorization is issued on the grantee's representation that the station is in compliance with the Federal Aviation Administration (FAA) requirements as set forth in Section 17.4 of the Commission's Rules. 47 C.F.R. § 17.4.

The following condition applies when this authorization permits construction of or modifies the construction permit of a radio station.

This authorization shall be automatically forfeited if the station is not ready for operation by the required date of completion of construction unless an application for modification of authorization to request additional time to complete construction is filed by that date, together with a showing that failure to complete construction by the required date was due to factors not under control of the grantee.

Licensees are required to pay annual regulatory fees related to this authorization. The requirement to collect annual regulatory fees from regulatees is contained in Public Law 103-66, "The Omnibus Budget Reconciliation Act of 1993." These regulatory fees, which are likely to change each fiscal year, are used to offset costs associated with the Commission's enforcement, public service, international and policy and rulemaking activities. The Commission issues a Report and Order each year, setting the new regulatory fee rates. Receive only earth stations are exempt from payment of regulatory fees.